COCKPIT RESOURCE MANAGEMENT: EXPLORING THE ATTITUDE-PERFORMANCE LINKAGE

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ABSTRACT

Measured attitudes regarding cockpit management were contrasted for pilots whose line flying performance was independent1y evaluated by Check Airmen as above or below average. A highly significant discriminant function was obtained indicating that these attitudes are significant predictors of behavior. The performance of 95.7% of the pilots was correctly classified by the analysis. Implications of the results for cockpit resource management training and pilot selection are discussed.

INTRODUCTION

Improving crew coordination and management of cockpit resources has become an increasing concern for air carriers and the regulatory agency (Cooper, White, & Lauber, 1979; Foushee, 1984). This concern has been reflected in the development of formal courses aimed at improving crewmembers' skills in these areas. These include the Command Leadership course provided by United Airlines and a self-study course developed by Captain Robert Mudge, as well as a number of in-house programs at carriers.

Despite the commitment of substantial resources to providing this training, valid formal evaluations of its effectiveness are lacking although anecdotal reports of changes in attitude and behavior are abundant. The absence of methodologically sound evaluation of cockpit resource management training can be traced to a number of sensitive issues including Federal regulatory policy, protection of individuals, potential liability, and labor-management relations (e.g. Helmreich, Hackman, & Foushee, 1985).

The research reported here represents an indirect spproach to assessing the potential effectiveness of resource management

training through exploration of the relationships between attitudes concerning cockpit management and line performance. It has been argued elsewhere that training of the type employed for cockpit management can influence attitudes but is unlikely to effect any changes in underlying personality factors (Helmreich, 1983). Since personality constellations have been shown to relate significantly to line performance (Helmreich, 1982) and since the relationships between expressed attitudes and observed behavior are often tenuous (Abelson, 1972), a critical test is to determine the relationships between attitudes about cockpit management and observable behavior in line flying settings.

As part of ongoing research, a survey designed to measure attitudes about critical issues in flightdeck management was developed (Helmreich, 1984). The Cockpit Management Attitudes questionnaire contains twenty-five iterns reflecting factors that have been shown to relate to effective crew coordination (e.g. Cooper et al, 1979). To date, more than 600 airline pilots have completed the instrument, with results showing highly significant differences as a function of position (i.e. Captain, First or Second Officer) and organization (Helmreich, Siem, & Foushee, 1985). The present research relates the attitudes of a subset of these respondents to expert ratings of cockpit management practices in air transport operations.

METHOD

Instrument. All respondents completed the twenty-five item Cockpit Management Attitudes questionnaire. Each item consists of a statement followed by a five-choice Likert scale with responses ranging from "Agree Strongly" to "Disagree Strongly".

Respondents. The attitude database currently contains data from 658 pilots employed by three major airlines. The subset of the database used in the present study consisted of 114 pilots currently flying either the Boeing 727 or the Boeinq 737 for one of the carriers.

Raters. The raters in the study were five Check Airmen for the airline who are experienced in evaluating flightcrew performance. The raters were instructed to rate only pilots with whom they had enough direct operatianal experience to make a confident judgment of performance. Two types of ratings were elicited, One consisted of five point Likert ratings of overall flightdeck management ranging from 1= "extremely poor" to 5 = "outstanding". Two Check Airmen with formal training in cockpit resource management used these rating scales. The other raters evaluated only those they considered to be "outstanding" or "extremely poor" cockpit managers. A total of 271 ratings were obtained on 163 different pilots.

Criteria for inclusion. To be included in the study, a pilat had to have been rated by at least two Check Airmen. Those rated as "average" on the Likert scale were not included in the analysis. Two other restrictions applied: one was that the pilot

have a completed questionnaire in the database; the other was that there be no discrepancy in Check Airman ratings. Seven pilots (or 4.3% of the sample) were eliminated because of discrepant ratings, leaving a total of 114 with usable data.

Confidentiality of Data. All pilots completing the questionnaire were given assurance that their responses would remain confidential and that no individual responses would be released to management, Check Airmen, or any other party. The Haters, of course, were blind as to the responses given by individuals to the survey. Ratings and responses were merged and placed in a secure, de-identified database maintained at the University of Texas.

RESULTS

Discriminant analysis was used to contrast the attitudes of pilots judged as superior with those rated a5 below average. Eighteen attitudes were included in the analysis. The resultant Wilk's Lambda was 0.36 while the associated Chi Square was 36.78 (df = 18, p = .006). The results for classification of subjects show that 95.7% of the pilots were correctly assigned to their rated group by the discriminant function. The attitude issues providing most significant discrimination between groups are shown in Table 1 in descending order of predictive power. For each item, the opinion of the pilots rated as superior is given.

Table 1. Cockpit Management Attitudes Differentiating Groups

25. Decision making ability not as good in emergencies.
14. Encourage First Officers to question decisions.
8. Be aware of personal problems of fellow crewmembers.
9. Captain should not take control and fly in emergencies.
15. Disagree that FOs should only take control in the event of Captain incapacitation.
11. Disagree that FOs should only question Captain decisions when they threaten safety of flight.
10. Filat flying should verbalize his plans.
2. Pilots obligated to mention personal stress or physical problems.
22. Disagree that Captains should employ same style of management in all situations with all crewmembers.
13. Agree that conversation in cockpit should be kept to minimum except for operational matters.
7. Disagree that instructions to crewmembers should be general and non-specific.
19. Training one of Captains most important responsibilities.
20. Relaxed attitude essential to cooperative flightdeck.
23. Captain's responsibilities include coordinating cabin crew.
12. Disagree that Captain should give direct orders for procedures in all situations.

DISCUSSION

It is gratifying to discover that, in an area as critical as the conduct of flight operations, there is a direct linkage between self-reported attitudes and independent evaluations of performance. The discriminating attitudes begin to provide a picture of the effective and ineffective flightdeck manager. The high level of agreement among Check Airmen as to effective and ineffective pilots is also reassuring. It should also be noted that the ratings of effectiveness were global and were not tied to the specific attitudes measured by the survey. Factor analyses of the instrument have shown that it taps a number of discrete areas rather than any single dimension of management.

The Effective Pilot. Remembering that the attitude differences are relative and not indicative of a typology, it is still possible to summarize the characteristics of the superior pilot. The effective manager recognizes personal limitations and diminished decision-making in emergencies and encourages other crewmembers to question decisions and actions. This individual is sensitive to personal problems of other crewmembers that might effect operations and +eels obligated to discuss personal limitations. He or she recognizes the need for the pilot flying to verbalize plans and importance of the Captain's role in training other crewmembers. The effective manager also recognizes the need for a relaxed and harmonious flightdeck and the fact that optimal management style varies as a function of both situations and the characteristics of fellow crewmembers. This individual also stresses the Captain's responsibility for coordinating cabin crew activities.

The Ineffectual Manager. A very different picture emerges of those pilots rated as below average flightdeck managers. The stereotype of the "macho pilot" with the "Right Stuff" is clearly present. This individual does not recognize personal limitations due to stress and emergencies, does not utilize the resources of fellow crewmembers, is less sensitive to problems and reactions of others, and tends to employ a consistent, authoritarian style of management. The flightdeck managed by one of these individuals would be more tense and would reflect far less team coordination than that of the highly rated managers.

Implications for Resource Management Training. One of the problems with cockpit resource management training a5 it is currently implemented is that there has been little or no formal evaluation of the effectiveness of such interventions. The present study suggests that measures of cockpit management attitudes can be useful tools for assessing the behavioral impact of this type of training.

On a broader scale, given the demonstrated linkage between attitudes and behavior and given the fact that training programs can effect changes in attitudes, these data support belief in the utility af cockpit resource management training. It should be noted, however, that it is critical to reinforce changes in

attitude and to provide opportunities to place new attitudes in practice. For this reason, we feel strongly that such training needs to be conducted in conjunction with Line Oriented Flight Training (LOFT: Lauber & Foushee, 1981). In LOFT, pilots are given a chance to explore the impact of their behaviors and the enactment of their attitudes and the opportunity to experiment with di-fferent approaches to crew coordination.

A Cautionary Note. These data do not suggest that effective training can eliminate coordination problems in the airways, Earlier research has demonstrated that personality characteristics are also linked to crew performance and data also suggest moderate, but significant relationships between personality and cockpit management attitudes (Helmreich, Siem, & Foushee, 1985). Although the utility of personality factors in pilot selection is often discounted, recent findings suggest that personality +actors play a relatively limited role in performance in training but show larger effects in day to day task enactment (Helmreich, Sawin, 8 Carsrud, 1985). Improvements in overall crew coardinatiun must focus both an relevant personality characteristics in selection and on effective training in flightdeck management.

Next Steps. This study reports encouraging findings. However, it represents a limited sample in a single organization. The research needs to be extended to additional samples in other organizations and especially to samples drawn before training in cockpit resource management and at intervals after completion of training. Examining the stability of attitudes over time and their relationships with performance over time would give a much sharper picture of the utility of resource management training.

NOTE

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